

13 one of the plurality of data structures including network
14 traffic data:

15 a) stored at a different resolution than the
16 resolution at which network traffic data is stored in the
17 other ones of the plurality of data structures; and

18 b) corresponding to a period of time which overlaps
19 the period of time for which network traffic data is stored
20 in the other ones of the plurality of data structures;

21 means for updating, in parallel, at least one record
22 in the different first-in, first-out data structures with
23 the collected network traffic data, and

24 means for overwriting the oldest data records in the
25 first-in, first-out data structure used to store one of the
26 network traffic data sets, when the limited amount of data
27 storage space used for said first-in, first-out data
28 structure is filled with records. --.

REMARKS

In view of the amendments presented above and the following discussion, the Applicants submit that none of the claims now pending in the application are obvious under the provisions of 35 USC § 103. Thus, the Applicants believe that all of these claims are now in allowable form.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, the Examiner should telephone Ms. Janet M. Skafar, Esq. at (650) 988-0655 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Objections

In response to the Examiner's objection, Applicants have amended claim 7 to insert the word "in" and have rewritten claim 7 in independent form.

Rejections under 35 USC § 103

A. Amended Independent claims 1, 12 and 17

The Examiner has rejected each of claims 1, 3-6, 8-14, 17, and 19-29 as being obvious under the provisions of 35 USC § 103 over the teachings in the Abe et al patent (United States Patent 5,966,509 issued October 12, 1999 to Hiroaki Abe). This rejection is respectfully traversed.

In essence, the Examiner recognizes that the Abe et al patent fails to disclose a method of transferring data to and removing data from a storage device. The Examiner then takes Official Notice that "FIFO (first-in, first-out) methods of storing and replacing data, buffering systems for data and multiple processors are old and well known in the art. FIFO systems are widely utilized to free space on a storage disc. By removing the oldest data, it is possible to free storage space for the newest data to occupy. A buffer, like a cache, is a midpoint holding place for data but exists not so much to accelerate the speed of an activity as to support the coordination of separate activities. Multiple processors provide added efficiency for the transfer of data between points." The Examiner then asserts that it "would have been obvious to

one of ordinary skill in the art at the time the invention was made to provide the data transfer system of Abe with a FIFO system, buffer and multiple processors as claimed. The rationale is as follows: one of ordinary skill in the art would have been motivated to provide the data storage device of Abe with a FIFO system in order to free storage space on the storage for the newest data by removing the oldest data, a buffer in order to coordinate data transfer activities and multiple processors in order to increase the speed and efficiency of the data transfer process." While this assertion appears facially plausible, when viewed in the context of the specific teachings in the Abe et al patent, this assertion does not stand up to close scrutiny.

Generally speaking, the Abe et al patent is directed to the same subject matter as the present Applicants; namely, network management. However, as the Examiner will soon see, the teachings of the Abe et al patent and those of the present invention sharply diverge.

In the Abe et al patent, a network management device for managing a plurality of network elements has a network element management data acquisition unit for acquiring, in stages, various management data possessed by the network elements when a session with a network element is resumed and when the network management device itself is started up. A rule management table stores a dependence relationship between an operation and management data necessary to execute the operation. When an operation has been specified, a feasible operation decision processing unit refers to the dependence relationship to determine

whether management data necessary to execute the operation has been acquired. If the necessary management data has been acquired, a network management execution unit executes network management conforming to the operation." (See Abe et al patent, Abstract).

In particular, in Fig. 41, the Abe et al patent illustrates various traffic data tables provided in a storage unit. The traffic data tables store data at different resolutions, such as fifteen minute, hourly, daily, monthly and yearly traffic data. A rounding unit processes the fifteen minute data into hourly data. (col. 21, lines 13 et seq.).

The Abe et al patent teaches an approach that gathers network traffic data in different resolutions for a designated time and time period. By designating the time period over which traffic data is collected, it is unnecessary to acquire traffic data constantly and it suffices to acquire and store traffic data solely with regard to a time period over which traffic management is to be actually performed. This makes it possible to reduce the necessary storage capacity of the storage unit and to shorten the time needed for acquisition of the traffic data. (col. 20, lines 14 et seq.)

The traffic data is stored in a three-dimensional matrix structure in which managed objects are arrayed along the x axis, management categories along the y axis and acquisition time along the z axis. In another embodiment of the Abe et al patent, by designating the object that is to

undergo traffic management, the Abe et al patent reduces the necessary storage capacity of the storage unit. (col. 15, lines 11 et seq.).

The acquired traffic data is then manipulated. (col. 20, lines 49 et seq.). A rounding unit 55a (FIG. 17) shapes and compresses the data successively to an average value, peak value and total amount of a higher ranking period of time in such a manner that traffic data that has been acquired at intervals of 15 minutes is shaped from minute units to hour units, from hour units to day units, from day units to week or month units and from month units to year units, stores the shaped and compressed data in the storage unit 52 and discards the data of lower order time periods as appropriate. (col. 20, lines 60 et seq.). The traffic data acquisition unit 51c successively stores traffic data $q(x)$ ($x=1-96$), which has been acquired every 15 minutes, in corresponding acquisition time locations of a 15-minute traffic table 71 (see FIG. 41) holding 96 records that correspond to one day (steps 401, 402) of data. The rounding unit 55a determines whether one hour of traffic data has been acquired (step 403). If one hour of traffic data has not been acquired, the program returns to step 401, whence the above-mentioned processing is repeated. If one hour of traffic data has been acquired, then the rounding unit 55a executes rounding processing every four records, which correspond to hour of data, obtains the average value, peak value and total amount per hour (step 404) and stores the results of rounding processing in a corresponding acquisition time location in

and hourly traffic data table 72 (FIG. 41) holding 24 records that correspond to one day of data (step 405).

As the Examiner can surely appreciate, the Abe patent successively updates the data tables after acquiring data in a lower data table. For example, the hourly traffic data table is updated based on the data of the 15-minute traffic table. This method places significant periodic demands for processing resources.

The Applicants take a markedly different approach. The present invention does not successively update traffic data tables. The Applicants use FIFO data structures which are updated in parallel. When a FIFO data structure becomes full, the oldest data is replaced. Therefore data collection continues while discarding the oldest data.

The Abe et al patent does not teach or suggest updating FIFO data structures in parallel. In particular, the Abe et al patent teaches away from updating records in parallel. As described above, the Abe patent successively updates the data tables after a sufficient amount of data has been collected in a lower level traffic data table. For example, the hourly traffic data table is updated after one hour of traffic data has been acquired in the fifteen-minute traffic table. Such teaching is inconsistent with the claimed invention.

Furthermore, the Abe et al patent does not teach or suggest using a FIFO data structure in the data

collection process, or using a FIFO data structure at each level of data resolution such that at least a portion of the data stored in the FIFOs overlaps. That FIFO methods of storing and replacing data may be well-known in the art does not render Applicants' invention obvious. The Applicants used a FIFO data structure in a novel way to limit the amount of data collected for network management. A separate FIFO data structure is used to store the data at each different resolution. The Abe et al patent has no such teaching. The FIFO data structures store data for overlapping periods of time. The Abe et al patent has no such teaching. When a FIFO data structure becomes full, the oldest data is overwritten. The Abe et al patent has no such teaching. In one embodiment, the storage space is allocated equally among the FIFO data structures. The FIFO data structures are allocated, the FIFO data structure associated with the time period having the highest resolution will become full first, and its data will be overwritten. The Abe et al patent has no such teaching.

Furthermore the FIFO data structure of the present invention is complementary to the method taught in the Abe et al patent, and therefore different from the Abe et al patent. A managed object could be specified for data collection and that data continuously stored in the FIFO. Eventually, a FIFO data structure will become full and data will be replaced.

The Abe et al patent also teaches away from the present invention which provides a system that can be updated continuously. In col. 20 lines 16 et seq., the Abe

et al patent states: "By designating the time period over which traffic data is collected, it is unnecessary to acquire traffic data constantly and it suffices to acquire and store traffic data solely with regard to a time period over which traffic management is to actually be performed. This makes it possible to reduces the necessary storage capacity of the storage unit and to shorten the time needed for acquisition of the traffic data."

Thus, the present invention is not shown, disclosed or suggested, whether explicitly or even implicitly, by the cited art, whether taken singly or in combination, including that put forth by the Examiner.

Independent claim 1, as amended, contains suitable limitations directed at the distinguishing aspects of the present invention. This claim, with these limitations shown in a bolded typeface, recites as follows:

"A method of processing and storing data in a computer system including processor circuitry, and a data storage device, the method comprising the steps of:

storing first and second sets of records in separate first-in, first-out data structures, respectively, on the data storage device, the first and second sets of records being of different data resolutions and corresponding to overlapping periods of time;

operating the processor circuitry to receive data collected over a period of time; and

operating the processor circuitry to update, in parallel, at least one record in each of the stored first and second sets of records with the received data such that a previous record included in each of the first and second data structures is replaced." [emphasis added].

Each of remaining independent claims 12 and 17 contains very similar distinguishing limitations to those recited in claim 1.

As such, the Applicants submit that none of their independent claims are rendered obvious by the teachings in the cited art. Hence, each of these independent claims is patentable under the provisions of 35 USC § 103.

Moreover, each of claims 3-6 and 8-11, 13-14 and 19-29 depends, either directly or indirectly, from independent claims 1, 12 and 17, respectively, and recites further distinguishing aspects of the present invention. As such, each of these dependent claims is also not rendered obvious over the teachings in the cited art for the same exact reasons set forth above. Hence, each of these dependent claims is also patentable under the provisions of 35 USC § 103.

Conclusion

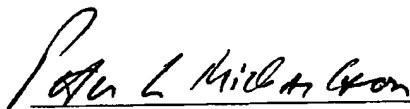
Thus, the Applicants submit that none of the claims, presently in the application, is obvious under the provisions of 35 USC § 103.

Consequently, the Applicants believe that all these claims are presently in condition for allowance.

Accordingly, the applicant(s) now request that this amendment be entered under the provisions of 37 C.F.R. § 1.116 and earnestly solicit reconsideration of this application and its swift passage to issue.

Respectfully submitted,

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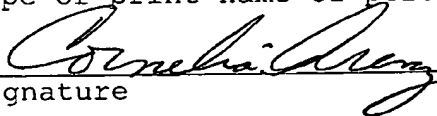
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